WHAT IS CLAIMED IS:

1. A reactor system for producing hydrogen from a hydrocarbon or hydrocarbon derivative using autothermal reformation, comprising:

a mixture formation chamber configured to form a mixture of the hydrocarbon or hydrocarbon derivative with water and air;

an autothermal reactor configured for simultaneous oxidation and steam reformation of the mixture, the autothermal reactor including a catalyst material; and

a temperature-regulated start-up burner configured to combust the hydrocarbon or hydrocarbon derivative with air so as to heat at least one of the mixture formation chamber and the autothermal reactor to a respective operating temperature, and configured to meter an air supply so as to regulate a temperature of hot gas coming out of the start-up burner to a value near or below a deterioration temperature of the catalyst material, before the hot gas contacts the at least one of the mixture formation chamber and the autothermal reactor.

2. The reactor system as recited in claim 1 wherein a flow of the hot gas is guided so that the hot gas heats the autothermal reactor without material contact with the catalyst material.

3. The reactor system as recited in claim 1 wherein a flow of the hot gas is guided into a reaction chamber of the autothermal reactor.

4. The reactor system as recited in claim 3 wherein the flow of the hot gas is guided into the reaction chamber via the mixture formation chamber.

5. The reactor system as recited in claim 4 wherein the flow of the hot gas is fed directly into the mixture formation chamber.

6. The reactor system as recited in claim 4 further comprising a heat exchanger configured to exchange heat between a product gas of the autothermal reactor and air

supplied to the mixture formation chamber, and wherein the flow of the hot gas is fed into a part of the heat exchanger through which the air is conducted.

7. The reactor system as recited in claim 1 wherein the start-up burner is configured to be operated using excess oxygen.

8. The reactor system as recited in claim 1 wherein the start-up burner includes a housing and a burner disposed in the housing and configured for bypass air to flow between the housing and the burner, the housing including a mixing zone configured to mix hot gas coming out of the burner with the bypass air.

9. The reactor system as recited in claim 1 wherein the hydrocarbon or hydrocarbon derivative is liquid at room temperature.

10. The reactor system as recited in claim 1 wherein the reactor system is disposed in a fuel cell-driven motor vehicle.